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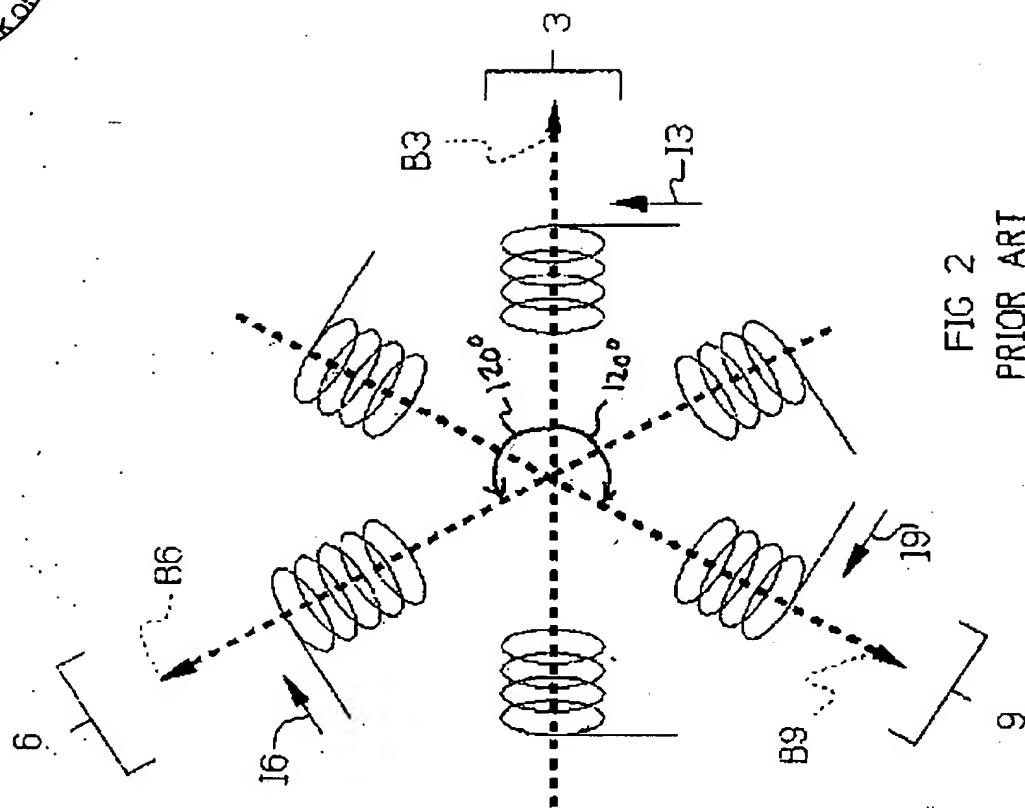


FIG 2
PRIOR ART

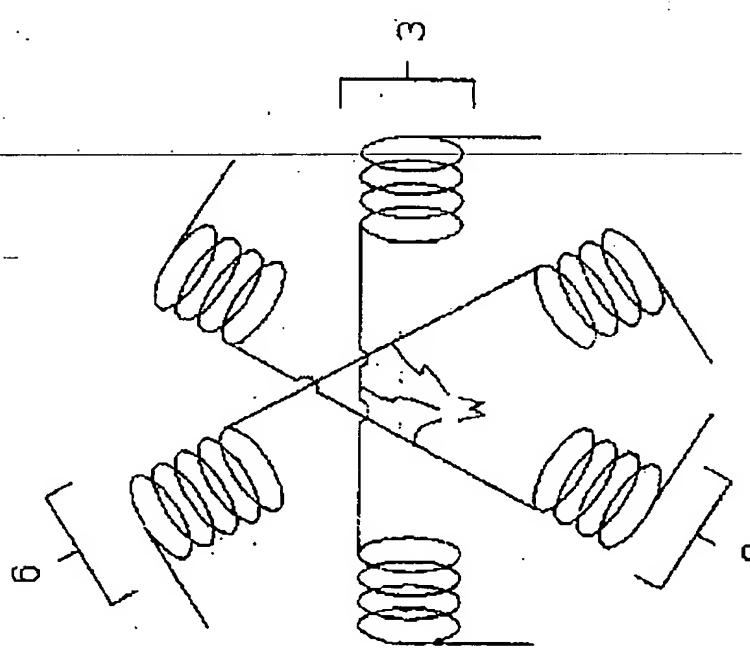


FIG 1
PRIOR ART

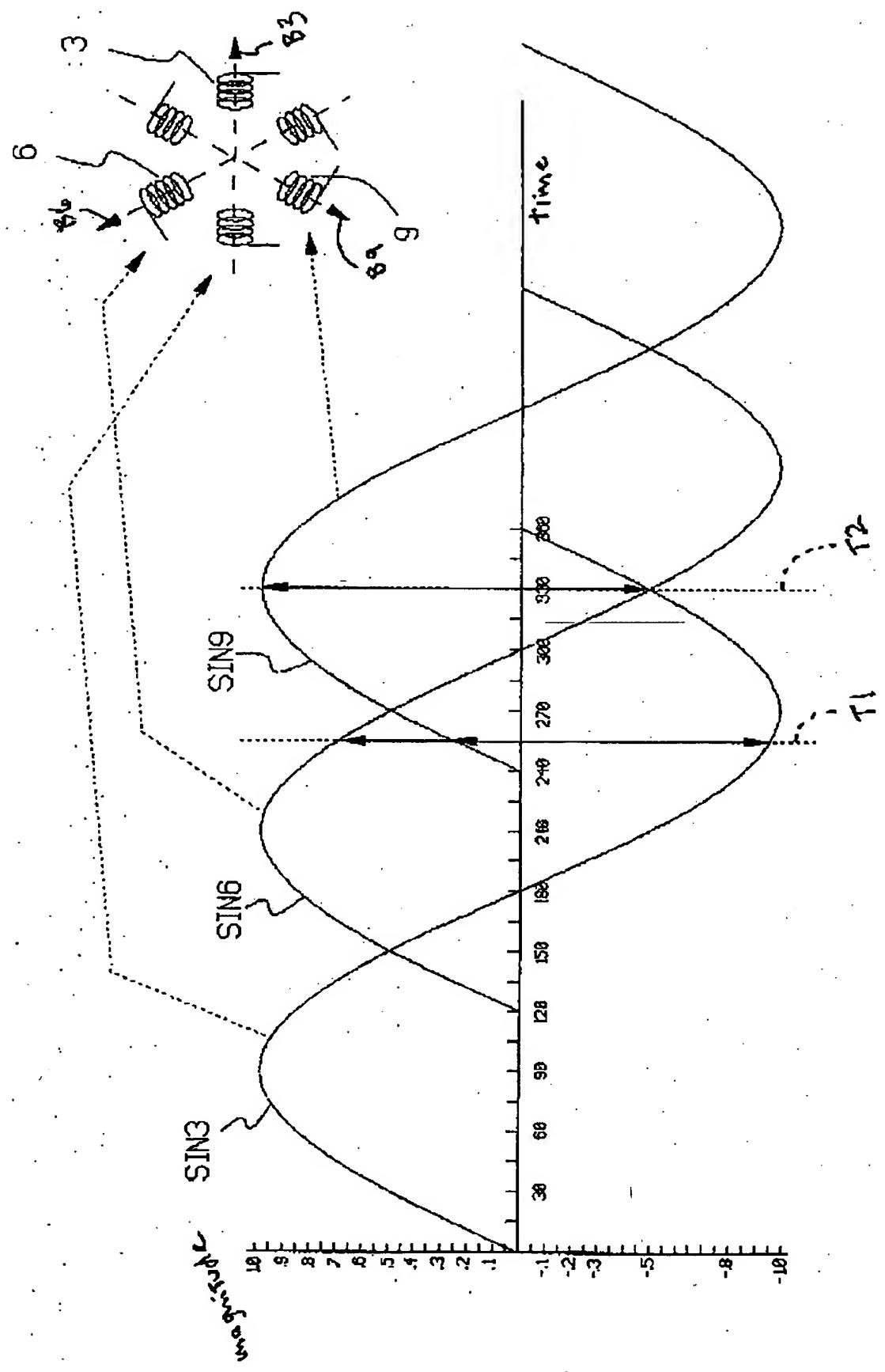
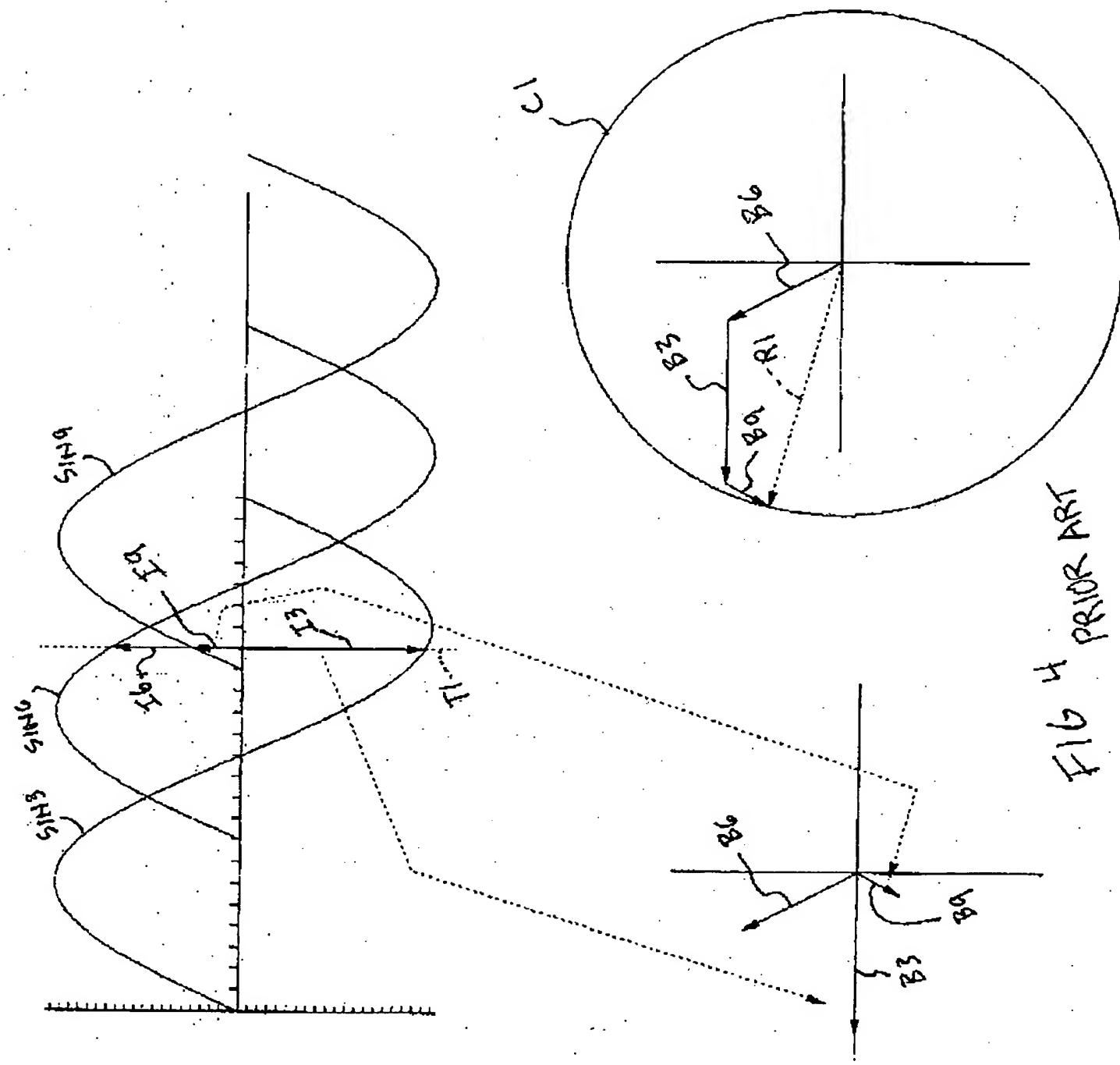
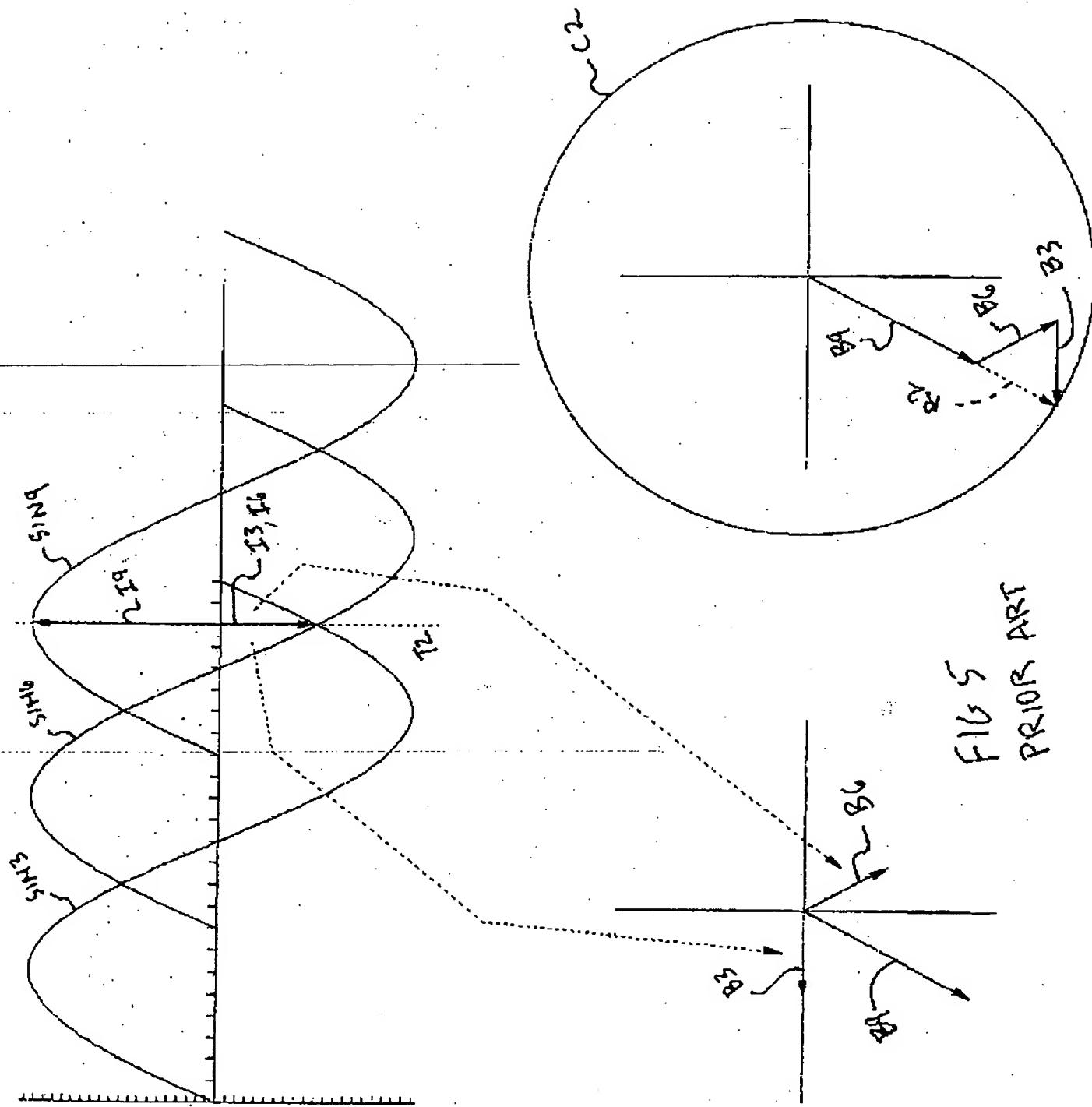


FIG 3 PRIOR ART



FILE 4 PRIOR ART



FILE 5
PRIORITY ART

۳۵

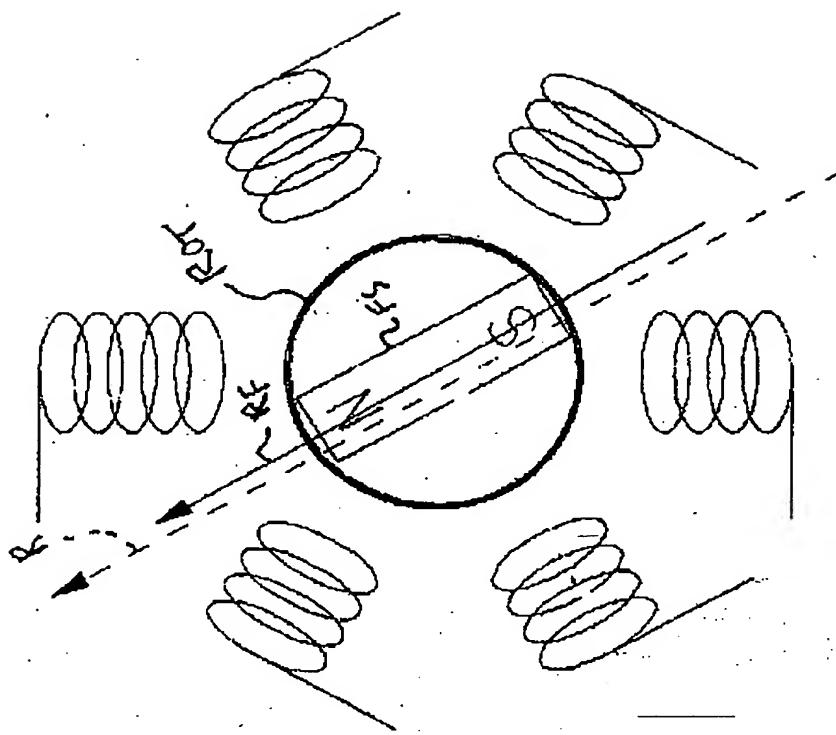


FIG 7
PRIOR ART

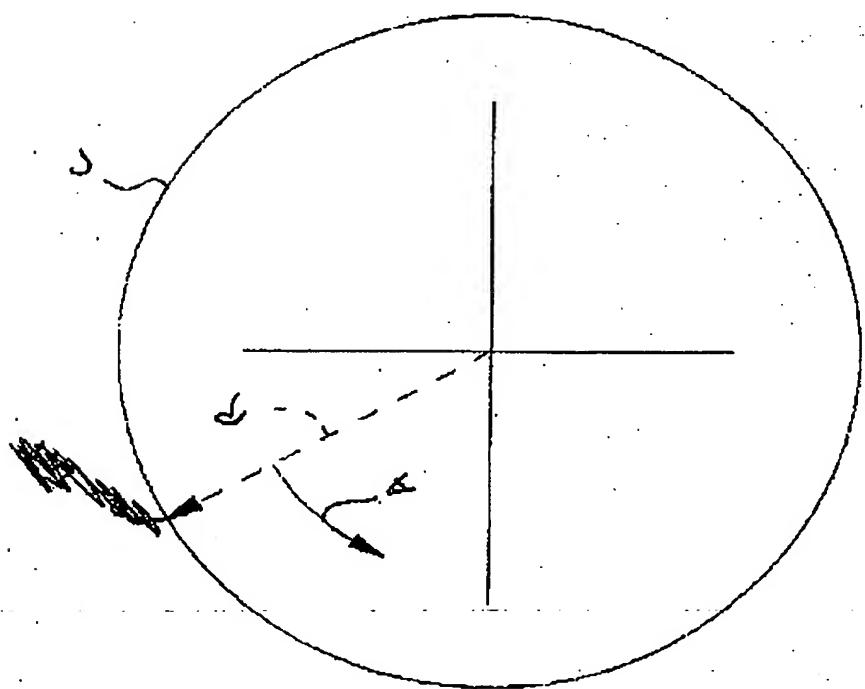
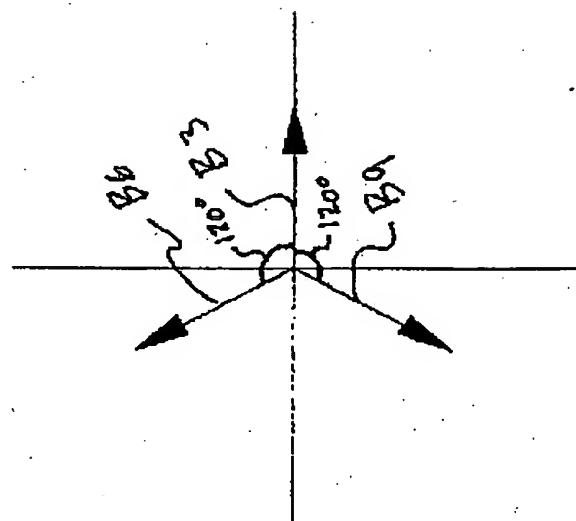
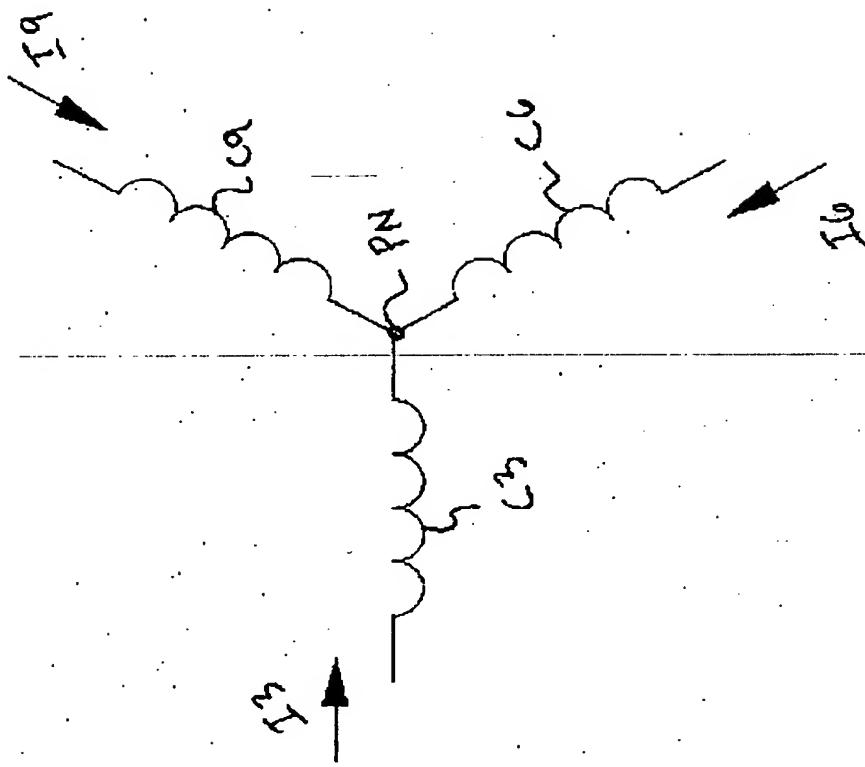


FIG 6
PRIOR ART

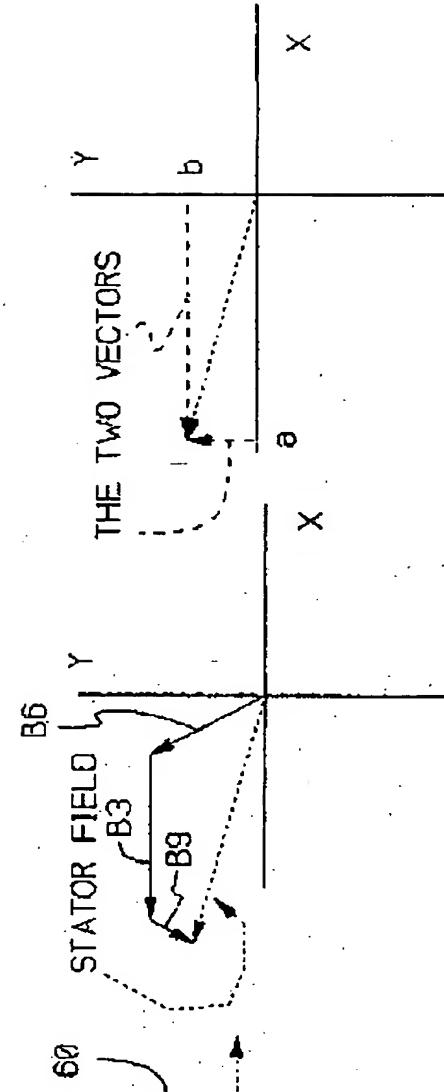
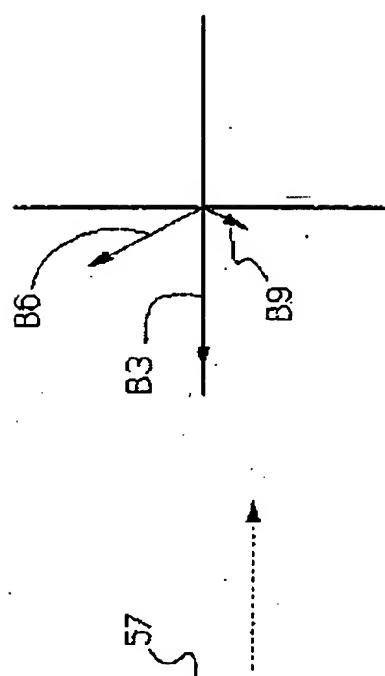


PREL
ART
F16 8

55
MEASURE EACH OF
THREE CURRENTS

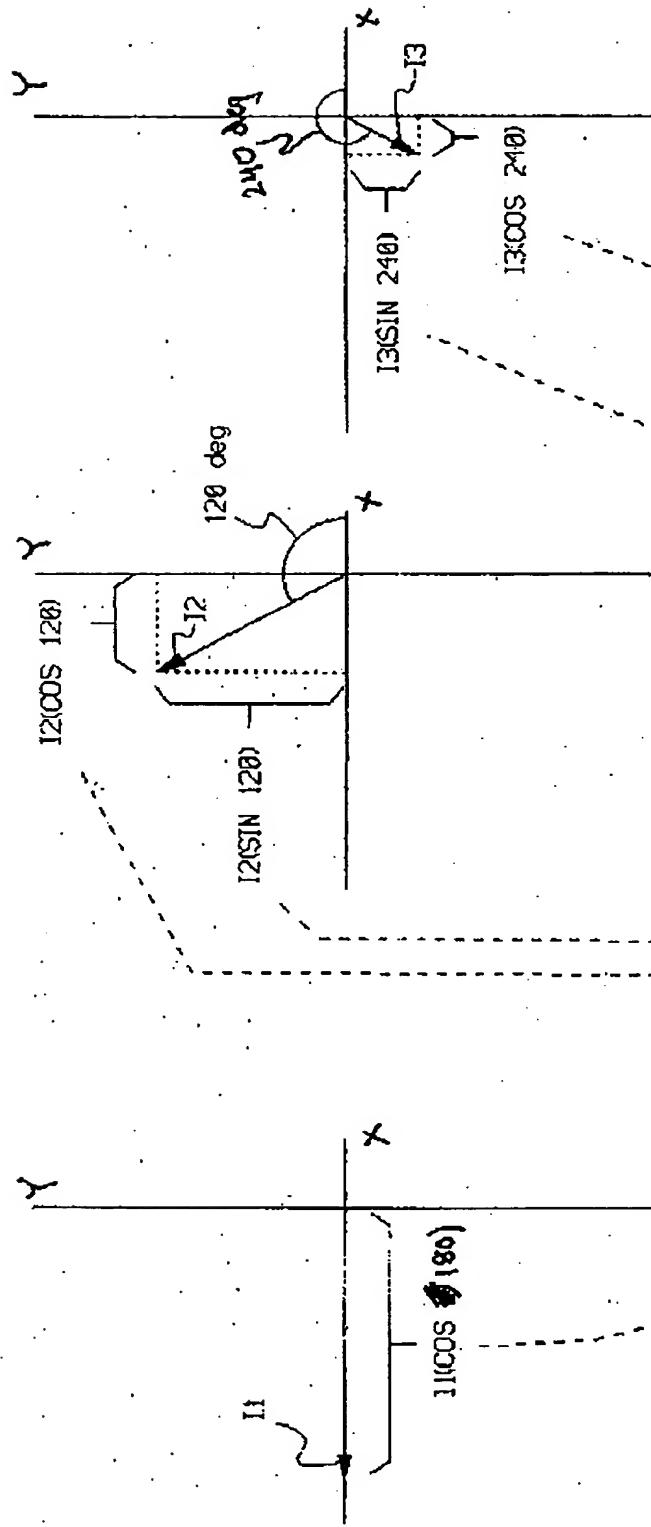
57
BASED ON KNOWN
ORIENTATION OF COILS,
COMPUTE VECTOR FOR
EACH CURRENT, IN
STATIONARY COORDINATE
SYSTEM

60
OBTAINTWO ORTHOGONAL
VECTORS WHICH SUM TO
STATOR VECTOR, IN
STATIONARY COORDINATE
SYSTEM



(SEE FIGURES 10 AND 11)

TO BLOCK 70
FIG 12

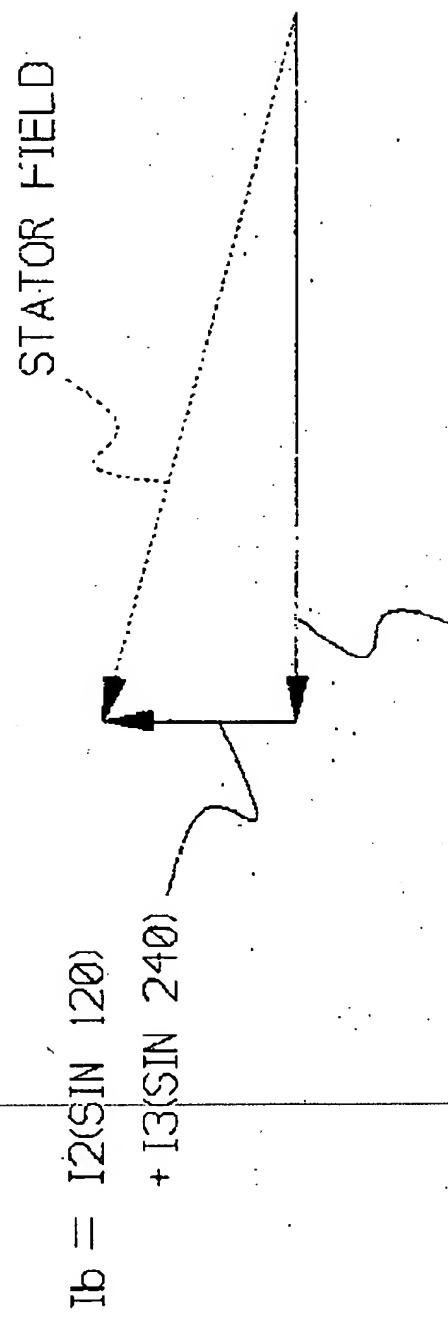


ARGUMENT DO
PHASE CYCLE
NOT CONSIDER
FOR VOLTAGE
THREE

$$I_b = I_2(\sin 120^\circ) + I_3(\sin 240^\circ)$$

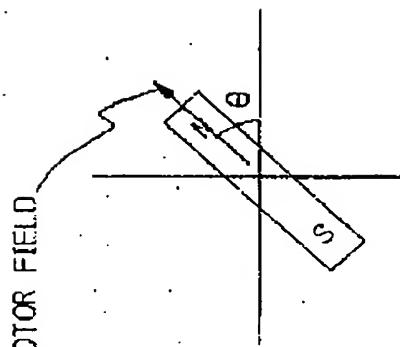
~~Fig 10~~
Fig 10
PRIOR STATE

$$I_b = I_1(\cos \theta) + I_2(\cos 120^\circ) + I_3(\cos 240^\circ)$$



$$Ia = I1(\cos 0) + I2(\cos 120) + I3(\cos 240)$$

Graph
Fig 11
prior
part



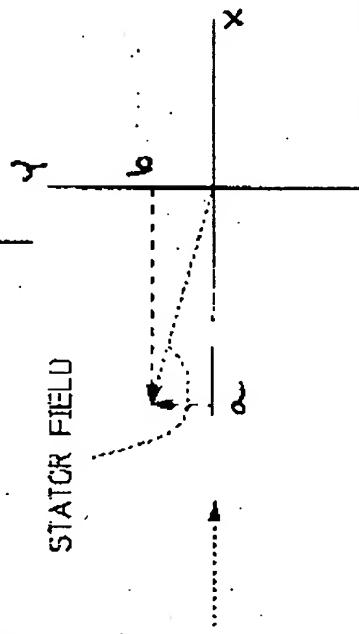
FROM BLOCK 60

Fig 9

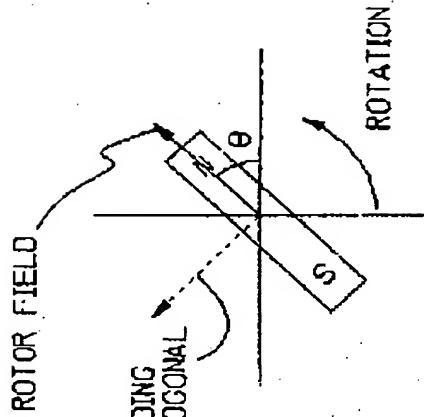
MEASURE ROTOR ANGLE θ

TRANSFORM TWO VECTORS
COMPUTED IN BLOCK 60 TO
ROTATING COORDINATE SYSTEM
ROTATED TO ANGLE θ .
i.e., obtain a_1 & b_1

STATOR FIELD



(SEE FIGURE 13)

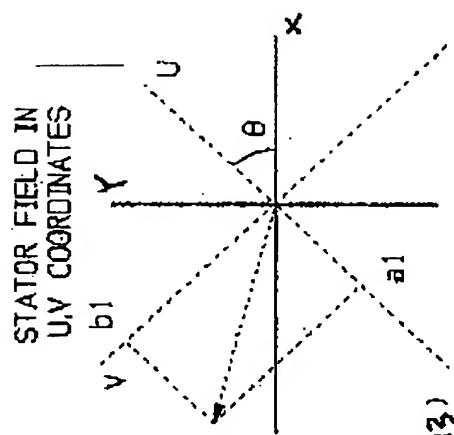


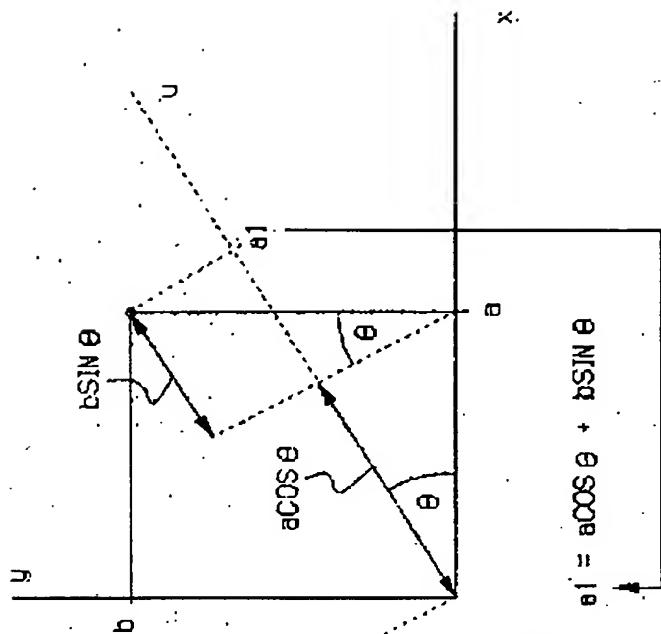
90

COMPUTE ERROR BETWEEN
STATOR FIELD, EXPRESSED IN
ROTATING COORDINATES, AND
LEADING ORTHOGONAL TO
ROTOR FIELD, EXPRESSED
IN ROTATING COORDINATES

to block 130
Fig 14

Fig 12
prior part





$$b_1 = a \cos \theta + b \sin \theta$$

$$b_1 = a \cos \theta + b \sin \theta$$

$$b_1 = -a \sin \theta + b \cos \theta$$

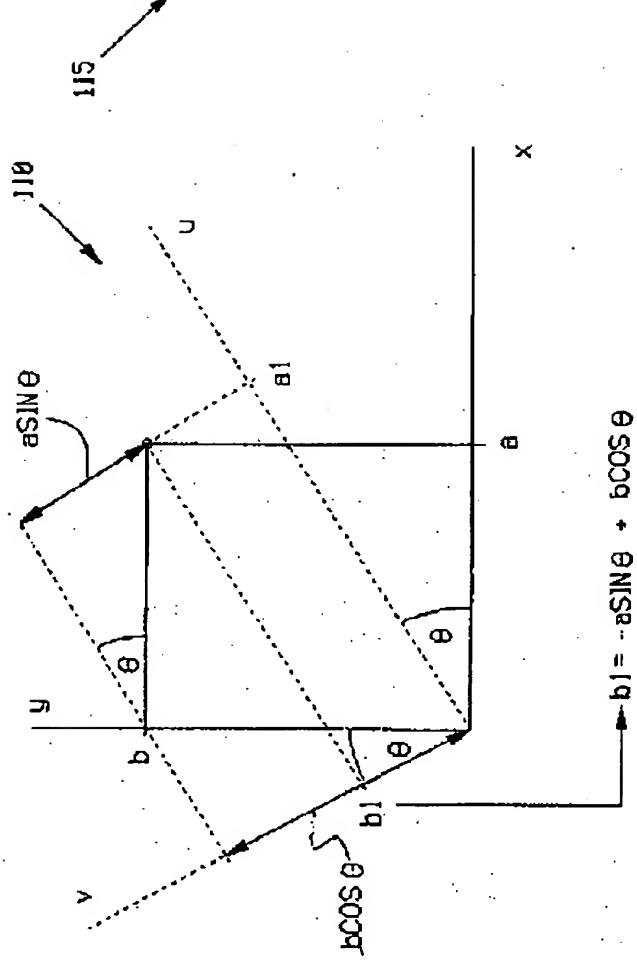
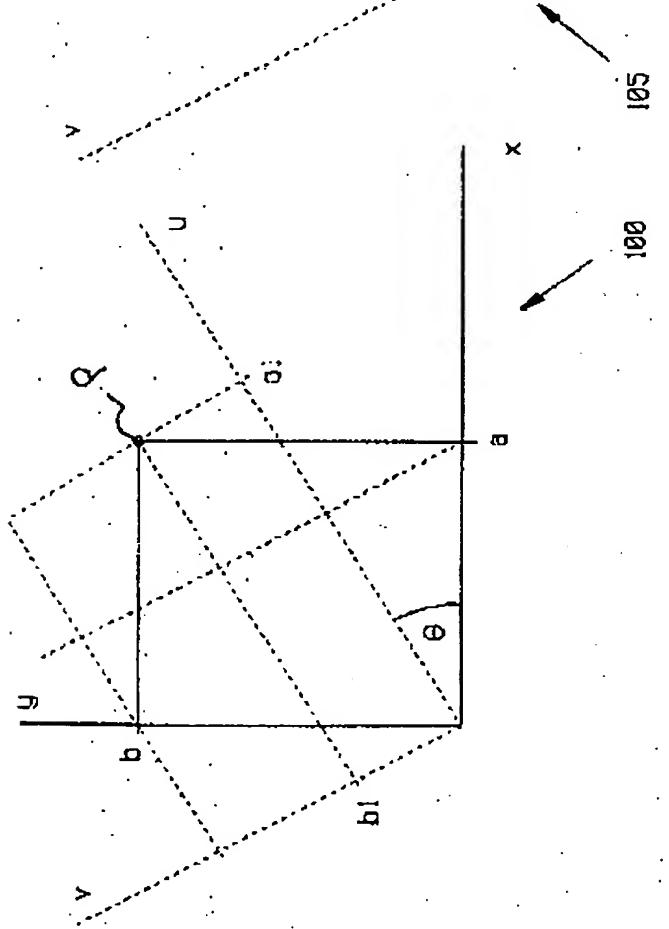
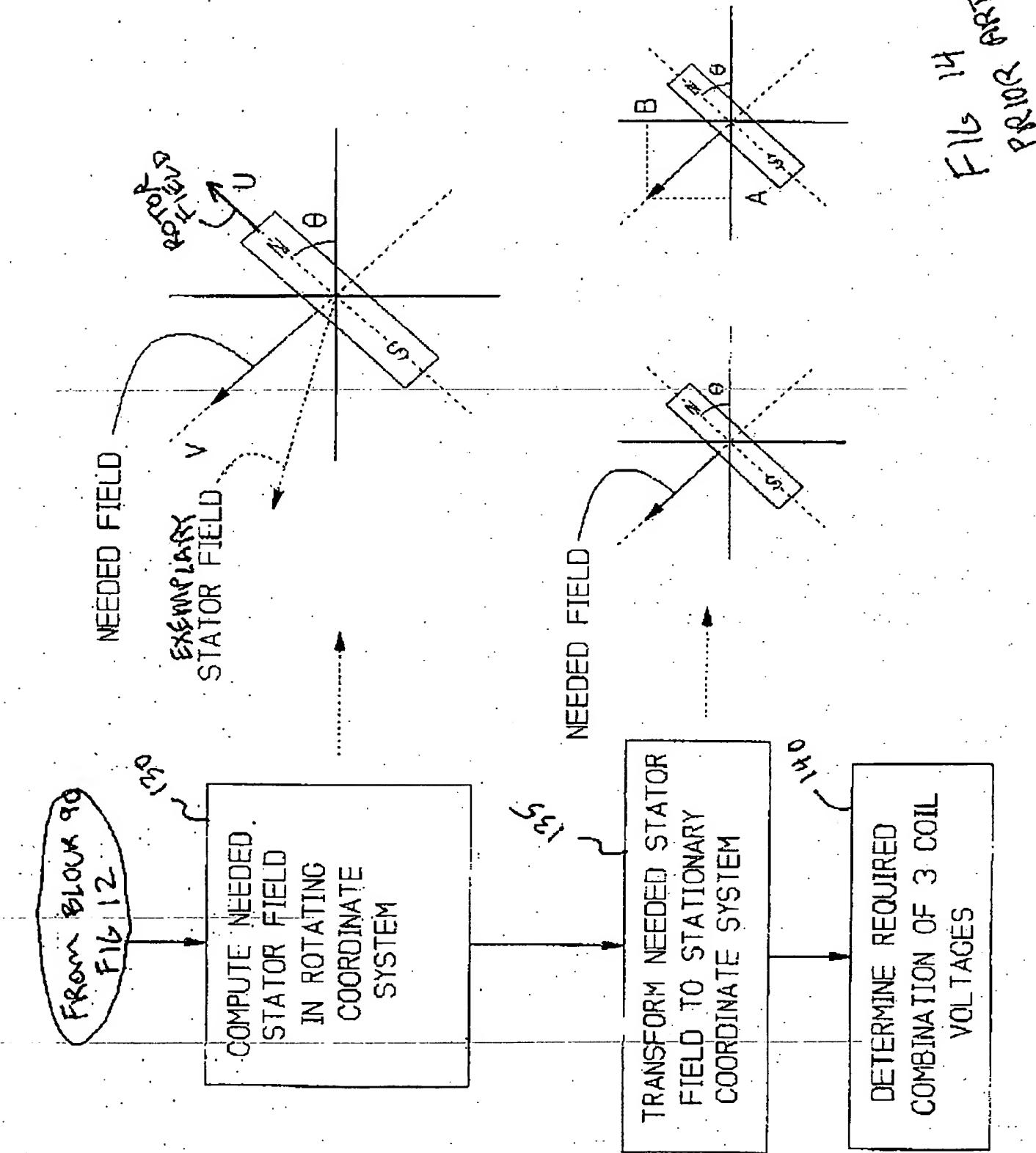
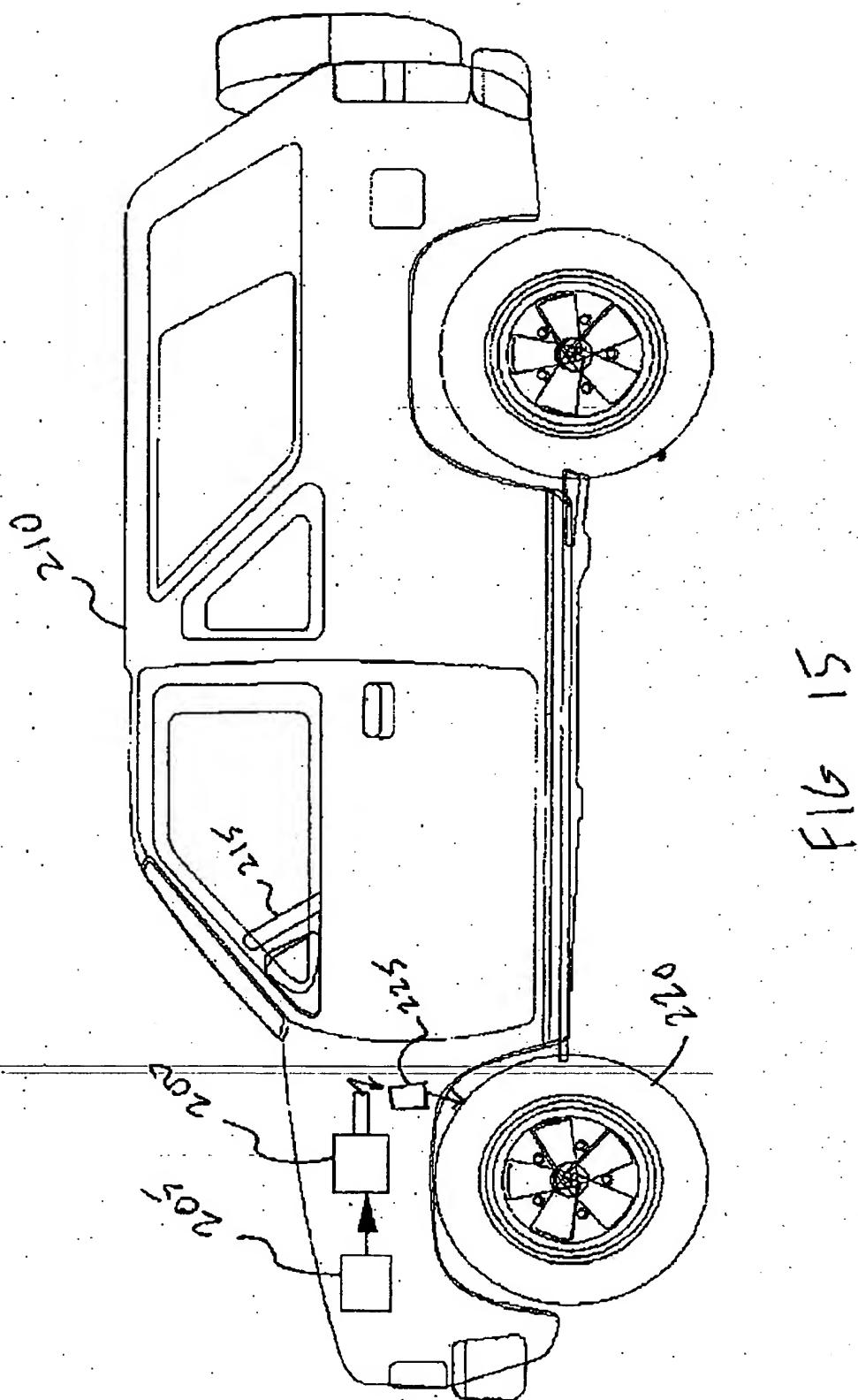


FIG 13
PRIOR ART





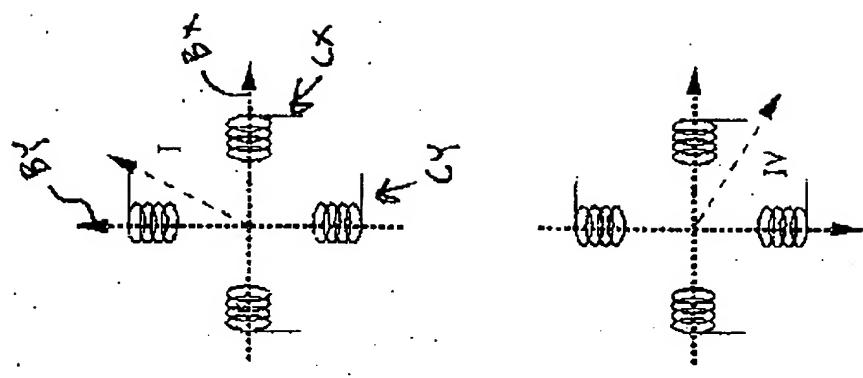
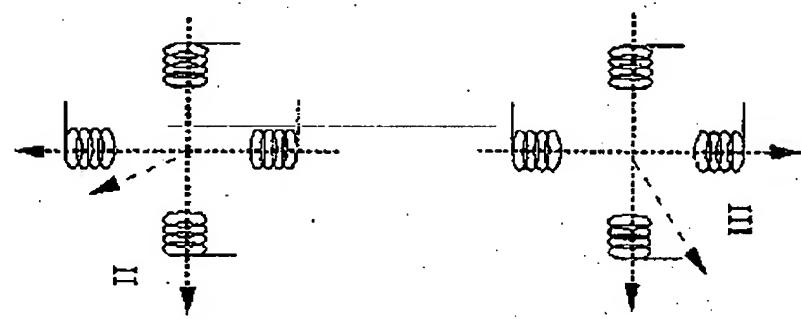


Fig 21



III

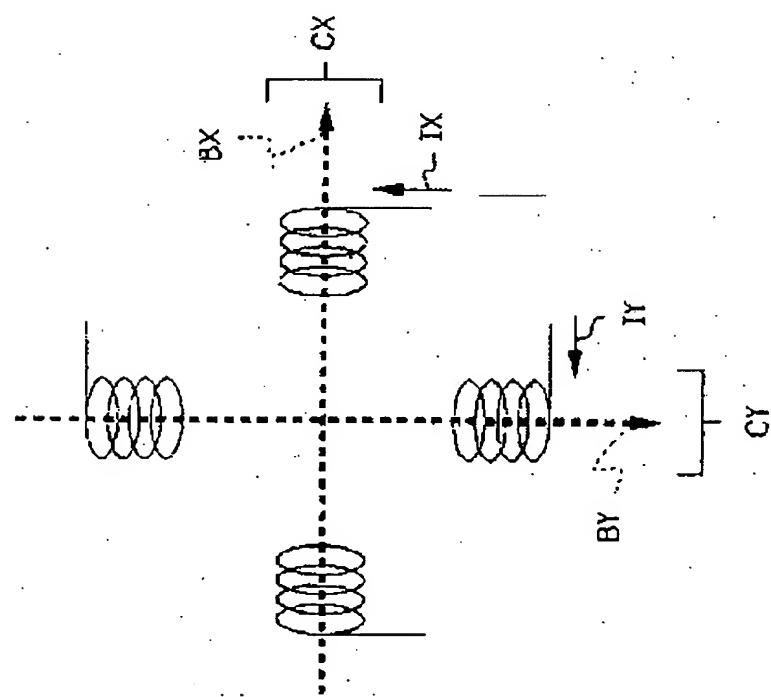
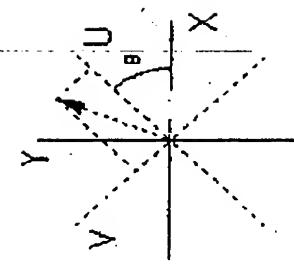
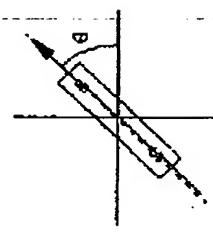
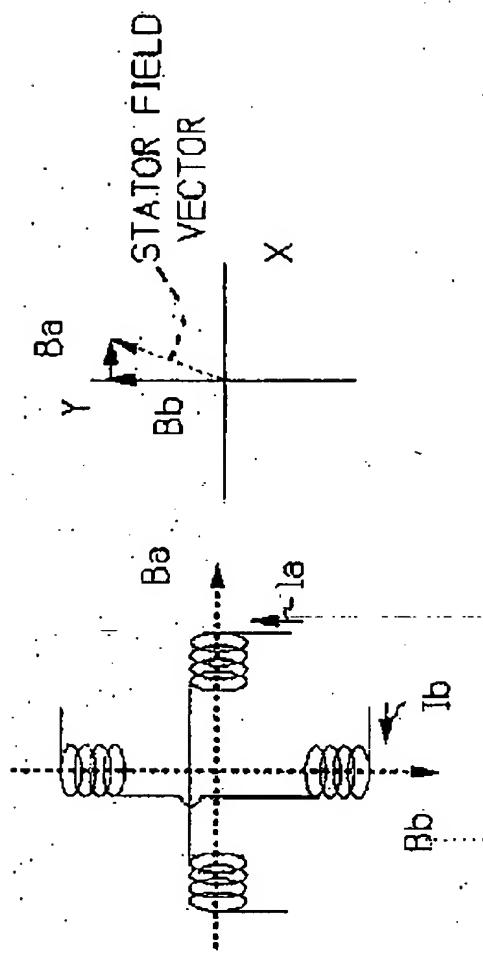


Fig 16

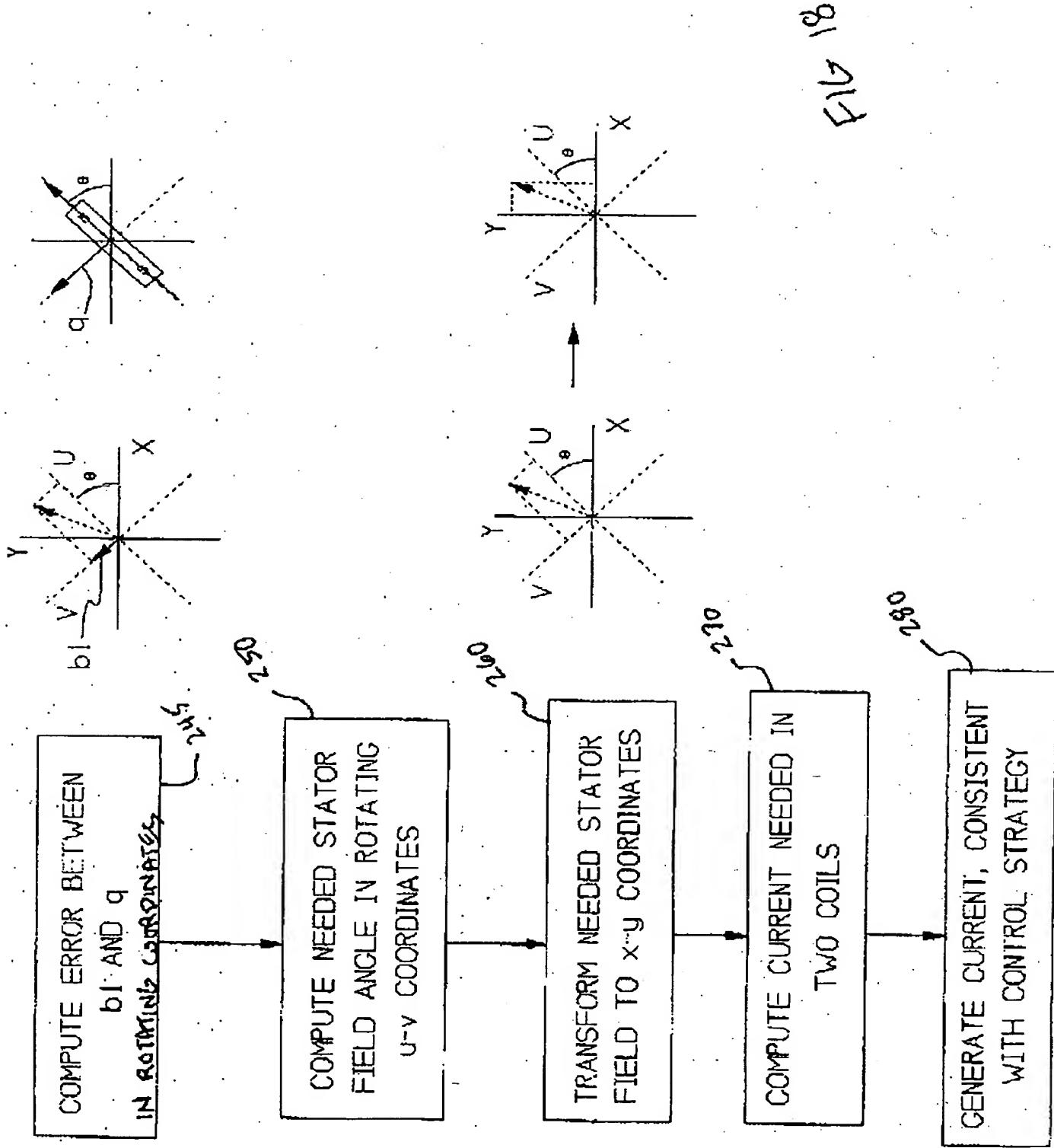


MEASURE TWO CURRENTS
THEREBY DERIVING
STATOR FIELD VECTOR

MEASURE ROTOR ANGLE

TRANSFORM STATOR FIELD
VECTOR TO ROTATING
U-V COORDINATE SYSTEM

FIG 17



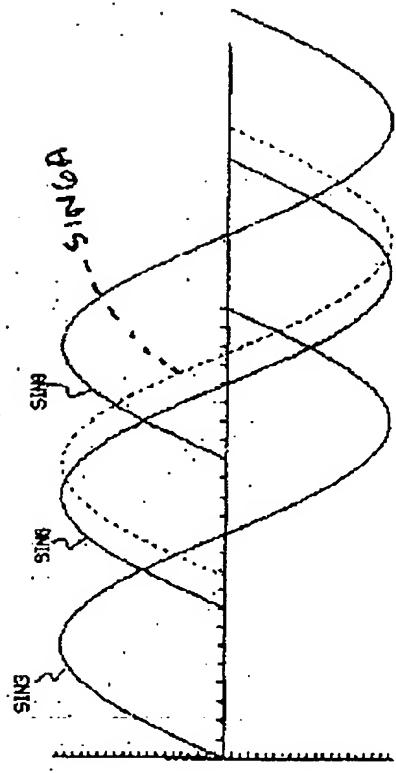


Fig 3

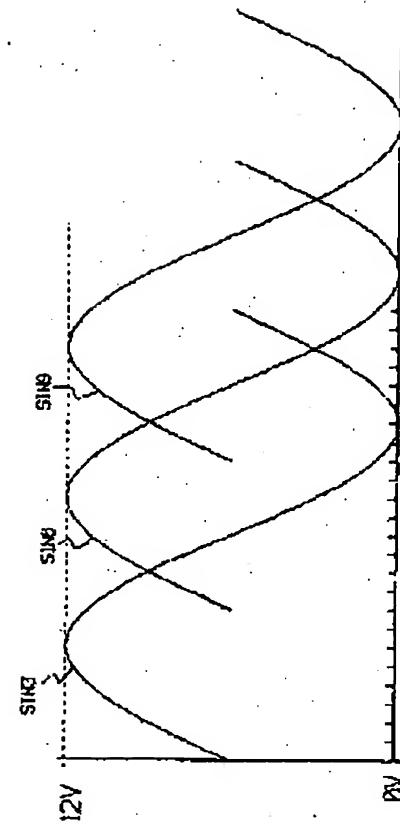
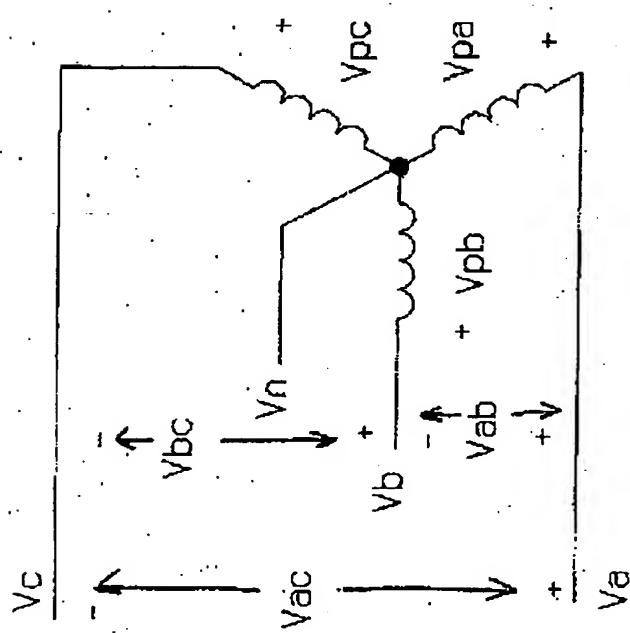


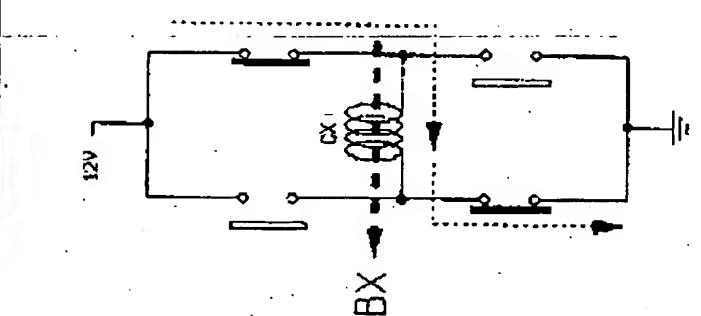
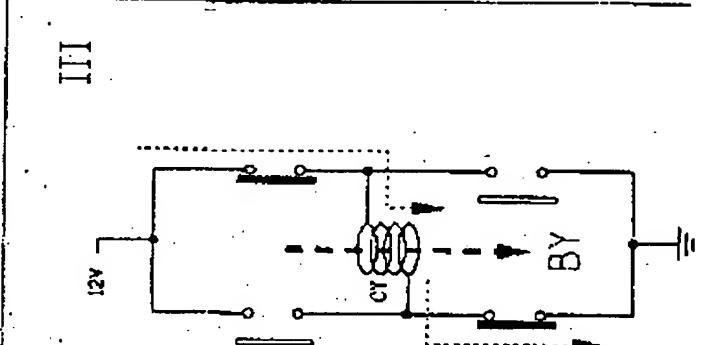
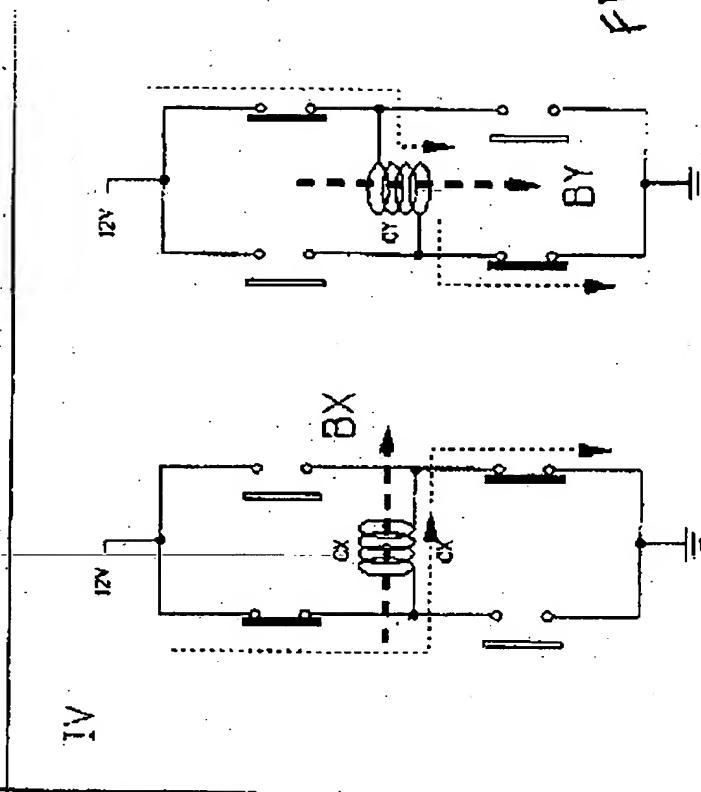
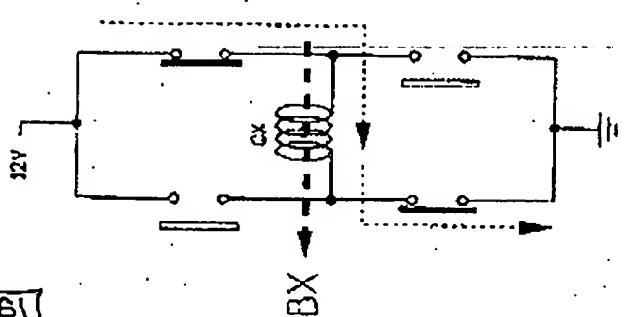
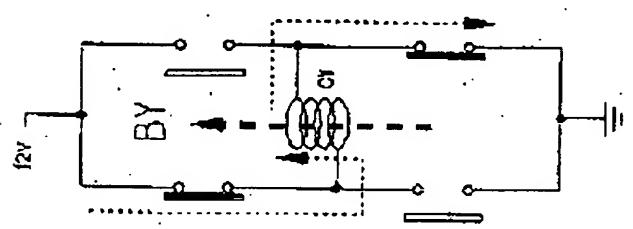
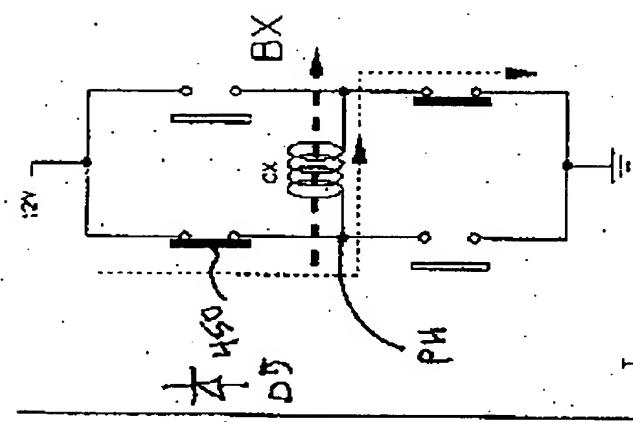
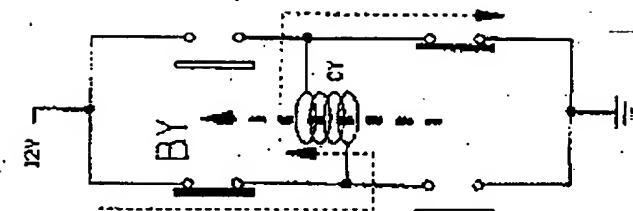
Fig 10 prior art



$$|V| = |V_{ab}| = |V_{bc}| = |V_{ca}| = \sqrt{3}|V_p|$$

$$\text{TOTAL POWER} = \sqrt{3} |V_{LINE}| |I_p|$$

PRIOR ART
Fig 20



22
F16

205

FIG 23

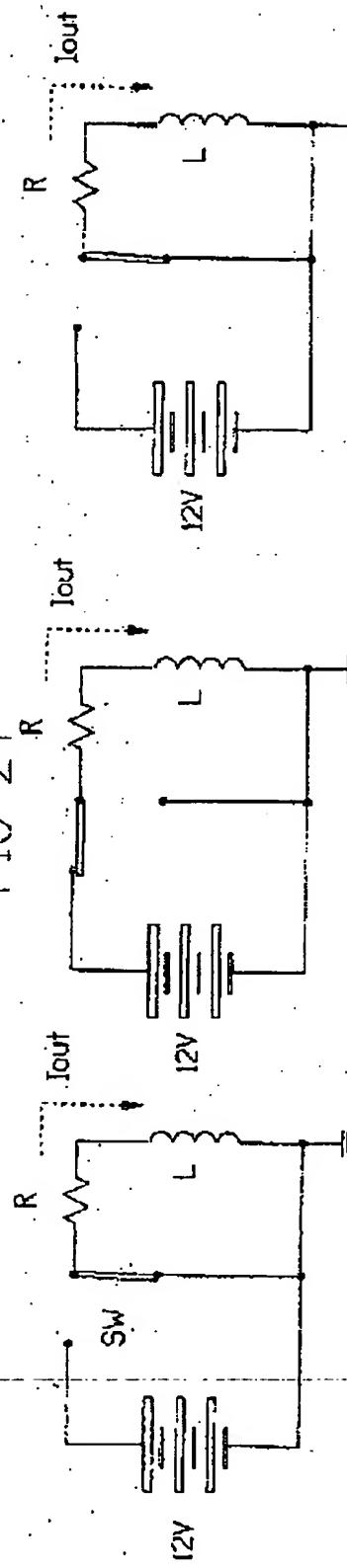


FIG 24

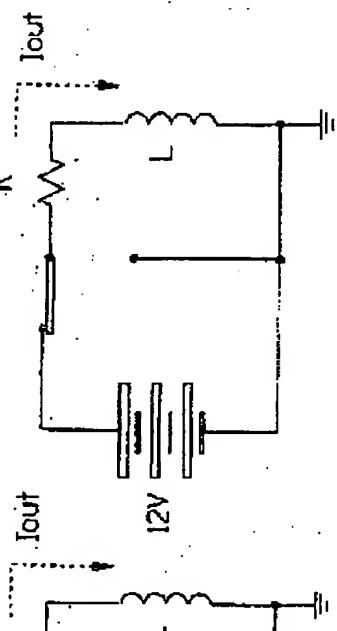


FIG 25

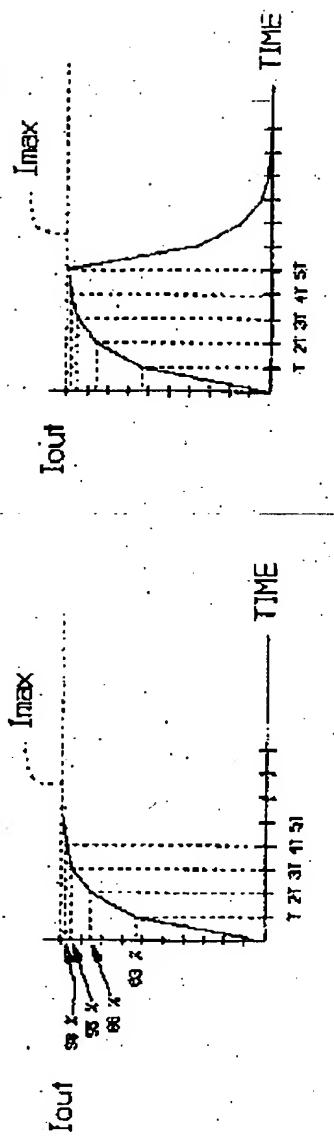
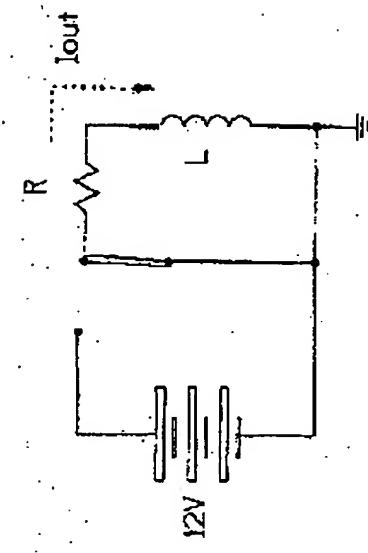
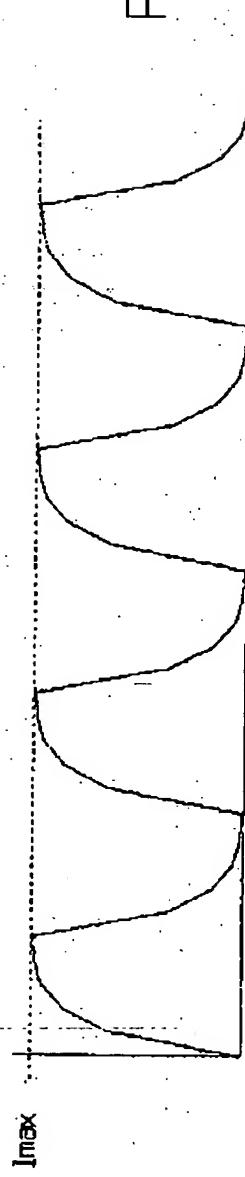


FIG 26



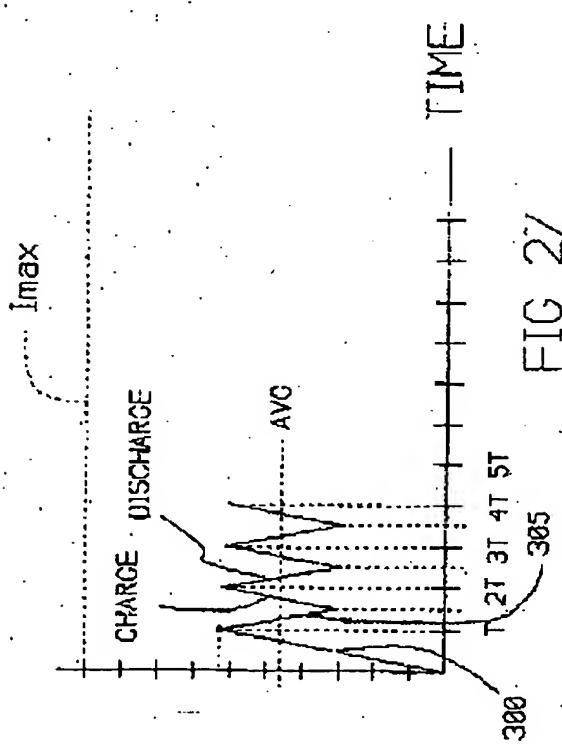


FIG 27

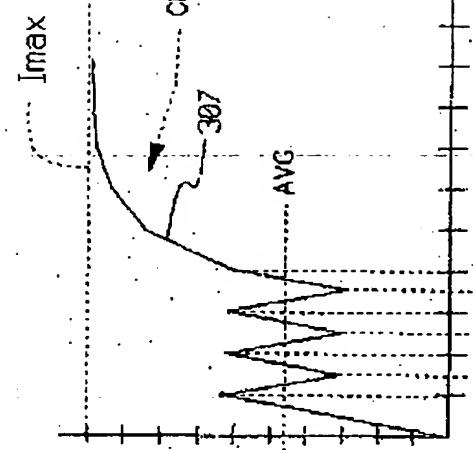


FIG 28

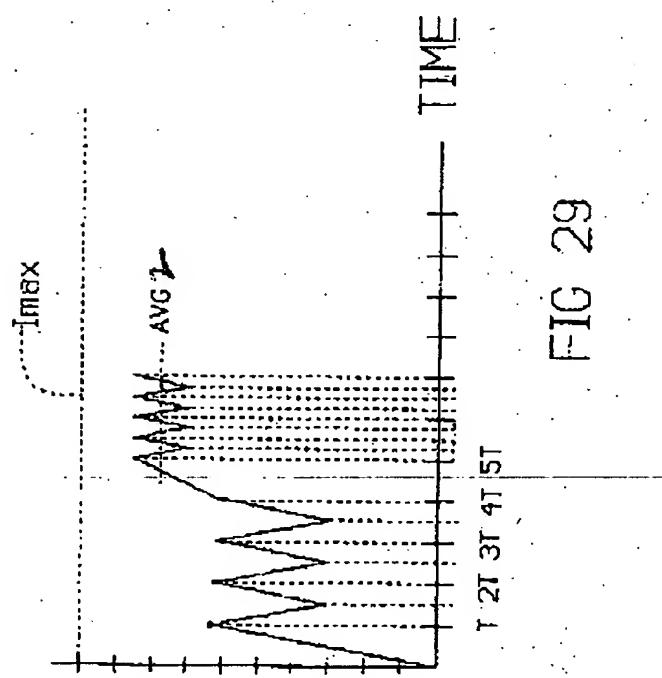


FIG 29

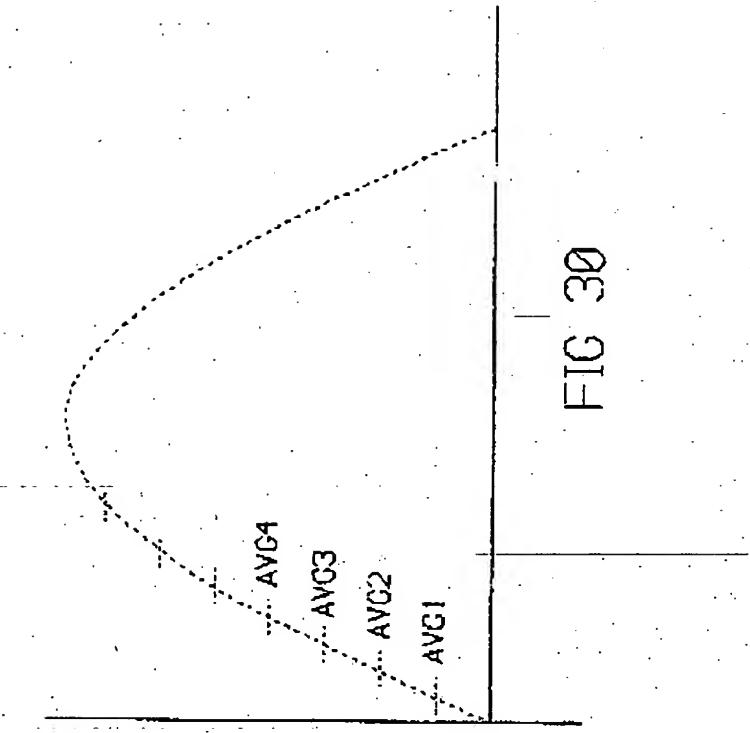
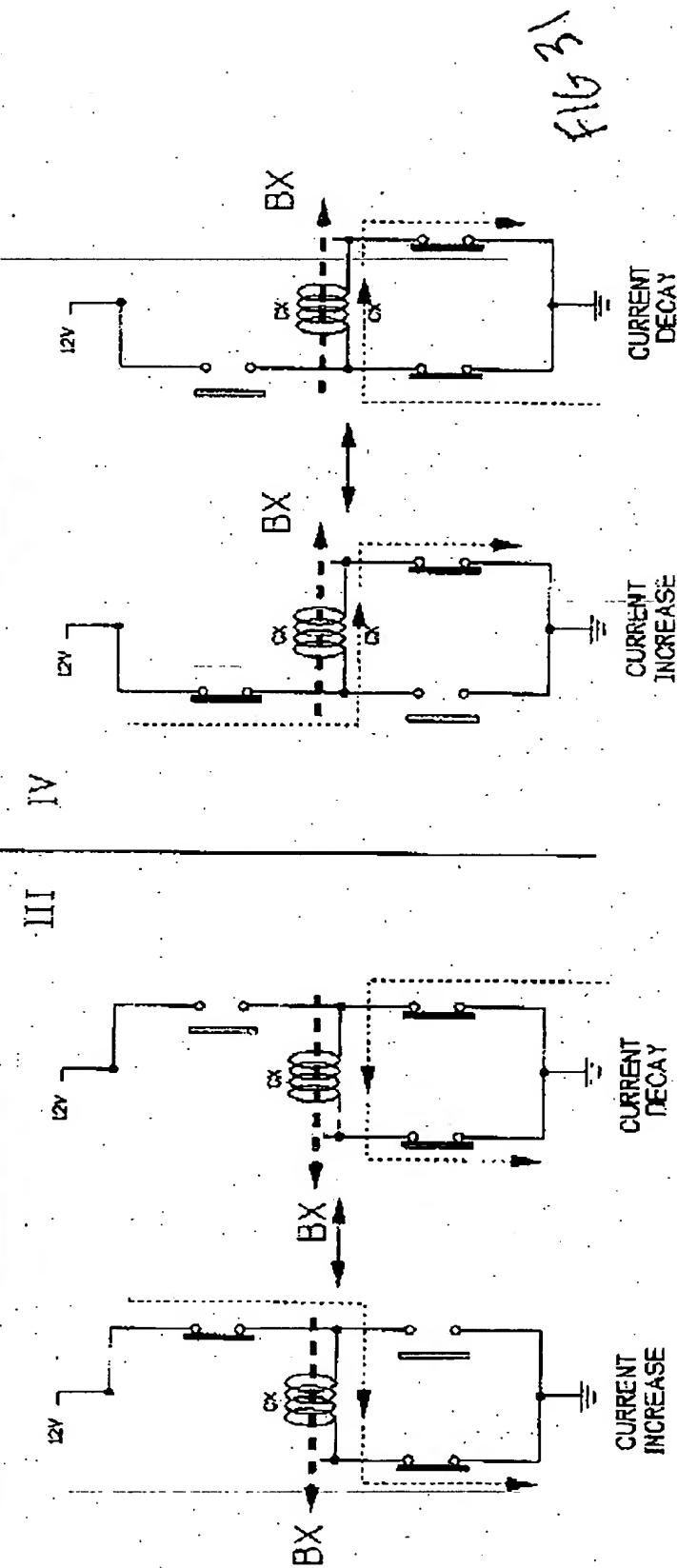
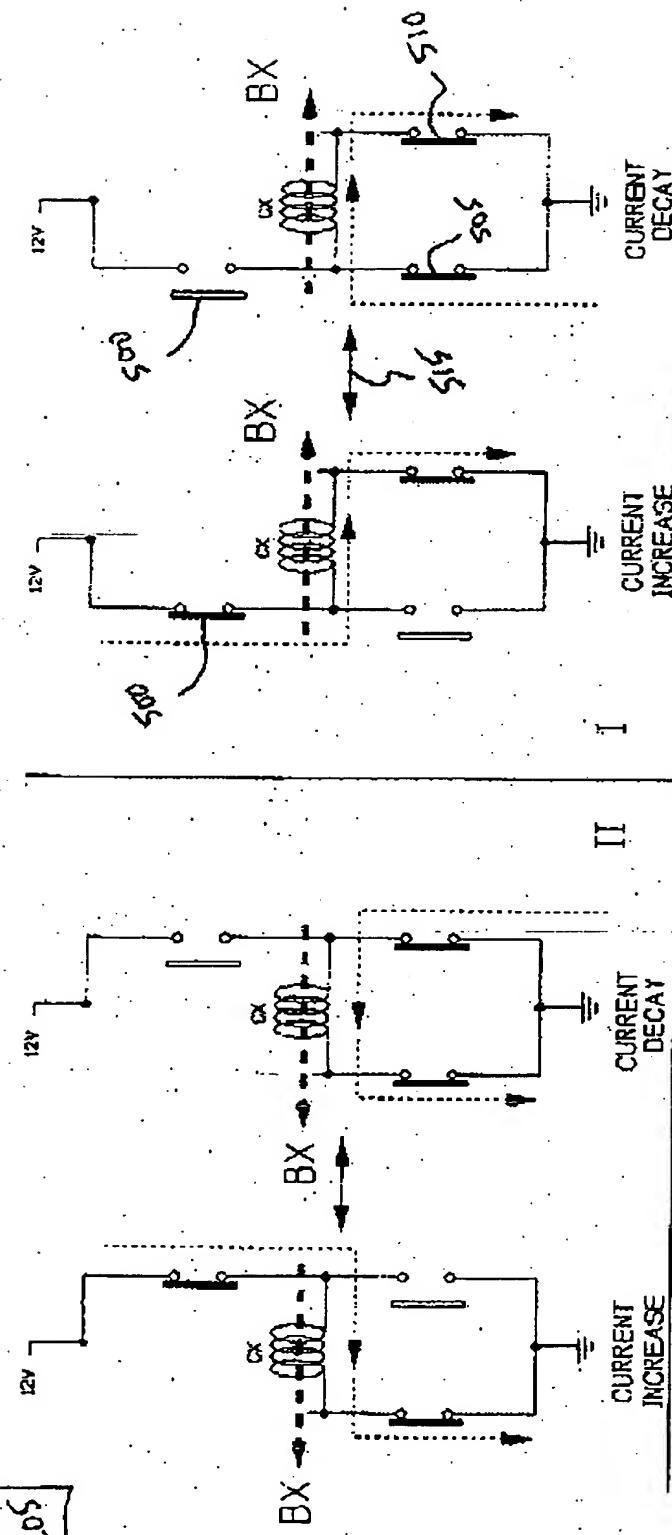


FIG 30



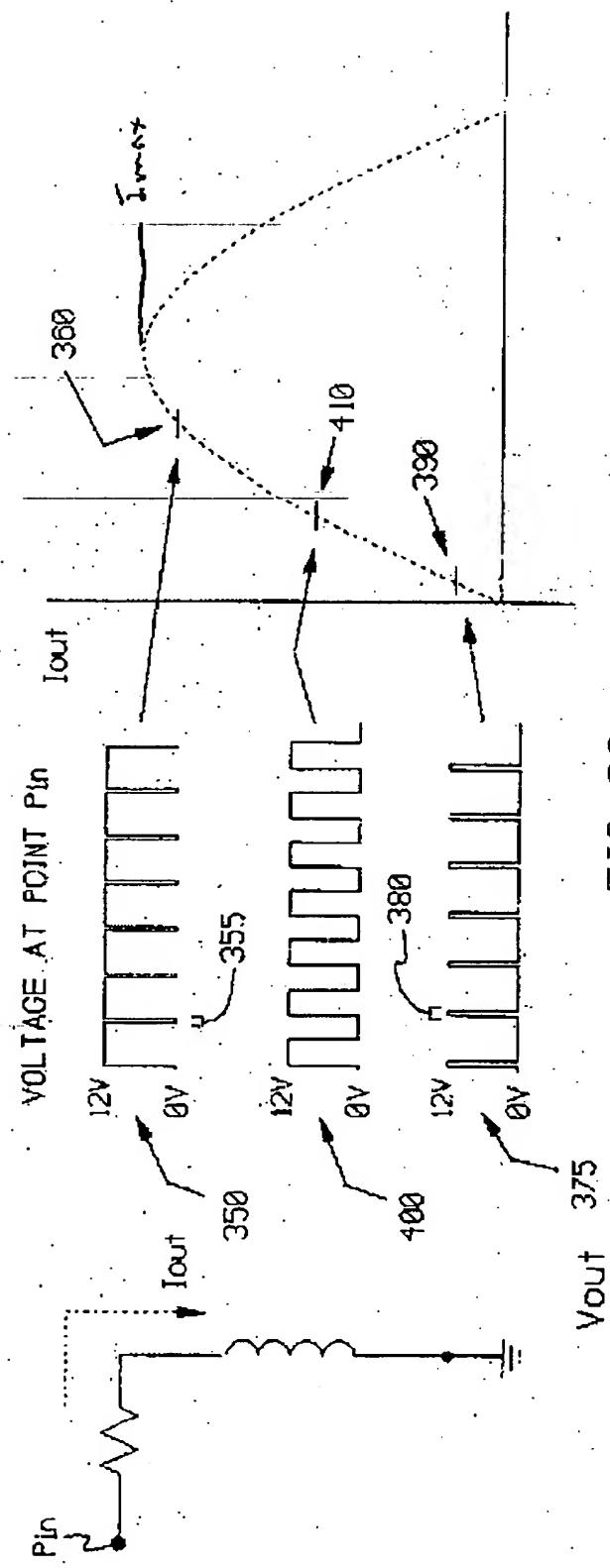


FIG 32

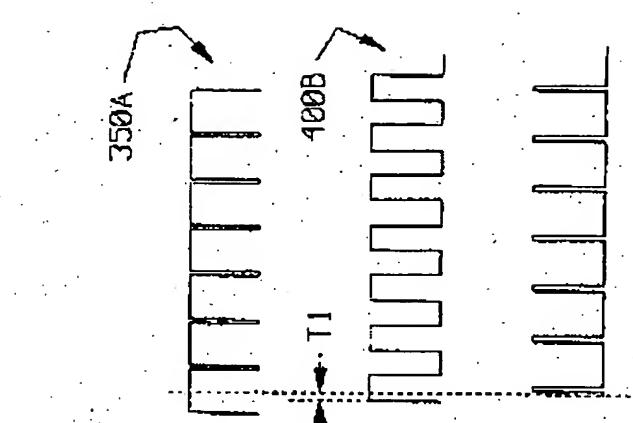
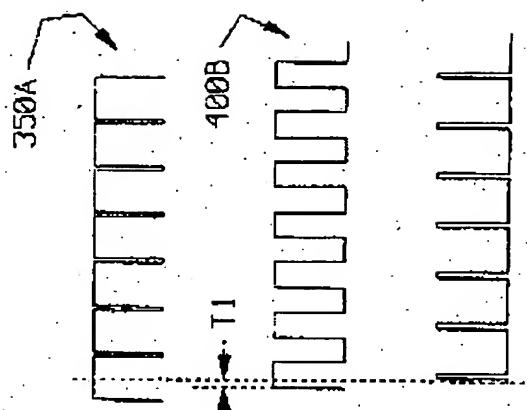
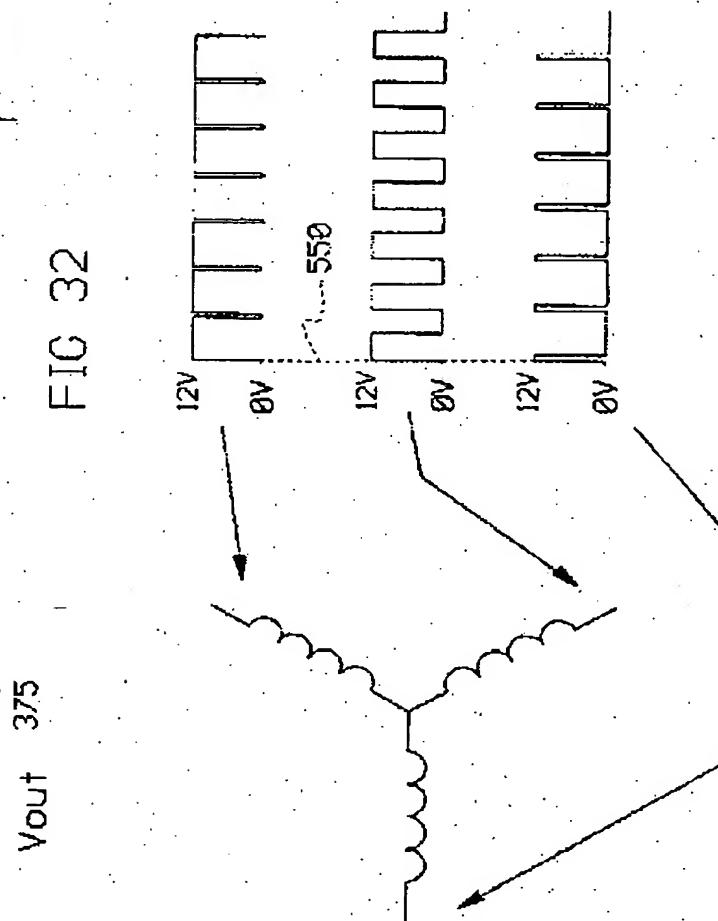


FIG 33



Motor Type	Phases	Commutation	Control
Brush DC Motor	3 slots	Mechanical	Open Loop
Permanent Magnet	4 slots		Voltage
Series Wound Field	...		Current
Shunt Wound Field	n slots		Field Control
Compound Wound Field			
Switched Reluctance Motor	1	Current regulated	Open Loop
	2	Voltage regulated	Voltage
	3		Current
	4		Phase Angle
Induction Motor	1	Sinusoidal space-vector	Open Loop
	2	Triangle - sine	Constant V/Hz
	3		FOC
	n		
Piezoelectric motor			
BRUSHLESS DC	2	SINE	FOC

INVENTION

FIG 35